Automatic Recognition of Noun-Noun-Relations via WordNet

WELL-KNOWN PROBLEM: The single elements of Noun-compounds form relations to each other, which are difficult to predict, e.g.

<table>
<thead>
<tr>
<th>Noun-compound</th>
<th>Relation description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butter knife</td>
<td>a knife that is used to spread butter</td>
</tr>
<tr>
<td>Steel knife</td>
<td>a knife that is made of steel</td>
</tr>
<tr>
<td>Pocket knife</td>
<td>a knife for the pocket</td>
</tr>
</tbody>
</table>

Even though the head noun is the same a change in the modifying noun changes the relation within the compound.

TASK: Find a way to automatically recognize the relation within compounds so it can be described within PARC’s AKR

PARC’s XLE (grammar development platform) and AKR (Abstract Knowledge Representation)  (http://www.parc.com/ist1/groups/nltt/xle/xle_toc.html)

WordNet Data - is fed into the XLE Pipeline

WordNet Hypernyms for “factory”:

1 sense of factory
Sense 1
{03281361} <noun.artifact> factory, mill, manufactory
=> {03912097} <noun.artifact> plant, works, industrial plant
=> {02886587} <noun.artifact> building complex, complex
=> {04290445} <noun.artifact> structure, construction
=> {00020846} <noun.Tops> artifact, artefact
=> {00003991} <noun.Tops> whole, unit
=> {00003122} <noun.Tops> object, physical object
=> {00001930} <noun.Tops> physical entity
=> {00001740} <noun.Tops> entity

Solution:

1) Abstract Noun-groups like „artifact“ can be constructed with the help of WordNet Hypernyms.
Nouns sharing certain Hypernym number can thus be recognized as a member of an abstract group.

   |- noun_class(artifact, 00020846).  “shoe”, “factory”
   |- noun_class(manufactory, 03912097).  “factory”

2) By defining the relations between different groups of nouns, the relations within Noun-compounds can be described automatically.

   @noun_relation(manufactory, artifact, manufacture).

3) Rule (XTE) that tests all the parameters of the relation and, in case of a positive match, assigns a specific role.

   noun_relation(HeadClass, %ModClass, %Role) ::=
   +%m_element(%, %Mod, %Head, %H),
   +subconcept(%Head, %HeadHypers),
   +subconcept(%Mod, %ModHypers),
   noun_class(%HeadClass, %HeadNo),
   noun_class(%ModClass, %ModNo),
   @check_class(%HeadNo, %HeadHypers),
   @check_class(%ModNo, %ModHypers)
   =>
   role(%Role, %Head, %Mod).

   check_class(%M, %S) =
   {member(%H, %S), memberchk(%M, %H)}.

The new AKR now contains a specific role describing the relation between the two compounds more closely.

Summary: --> 124 abstract noun-classes.
--> 115 specific relations to describe the relationship between two nouns.
--> 23 different roles to describe these relations.
--> 1 default-of-role for non-specific relations not covered by the above.

Positive Result: Most of the Noun compounds can be described with this solution,

Extensions: Pertainyms

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